ACMS Graduate & Postdoc Seminar

Jordy Lopez Garcia
University of Notre Dame

Wednesday, September 3, 2025
154 Hurley Hall
3:30 PM – 4:30 PM

Algebraic Geometry in Spectral Theory

The spectrum of a Schrödinger operator in a periodic medium is a fundamental object of interest in mathematical physics, and it is best approached using methods from analysis. The discrete version of this concerns operators on periodic graphs. In this case, the spectrum is a projection of the zero-set of a polynomial known as the Bloch variety (or dispersion relation) of the operator. Thus, algebraic geometry becomes relevant to the study of periodic graph operators. Motivated by the work of Bättig, we compactify the Bloch variety of a periodic graph operator inside the toric variety associated to its Newton polytope. For a family of periodic graphs, we extend this operator to the toric variety by expressing the compactification as the support of a kernel sheaf and obtain asymptotic eigenvalue problems. We outline a few spectral-theoretic consequences of this construction. This is joint work with Matthew Faust (MSU), Stephen Shipman (LSU), and Frank Sottile (TAMU).